CENTENNIAL PUMPS

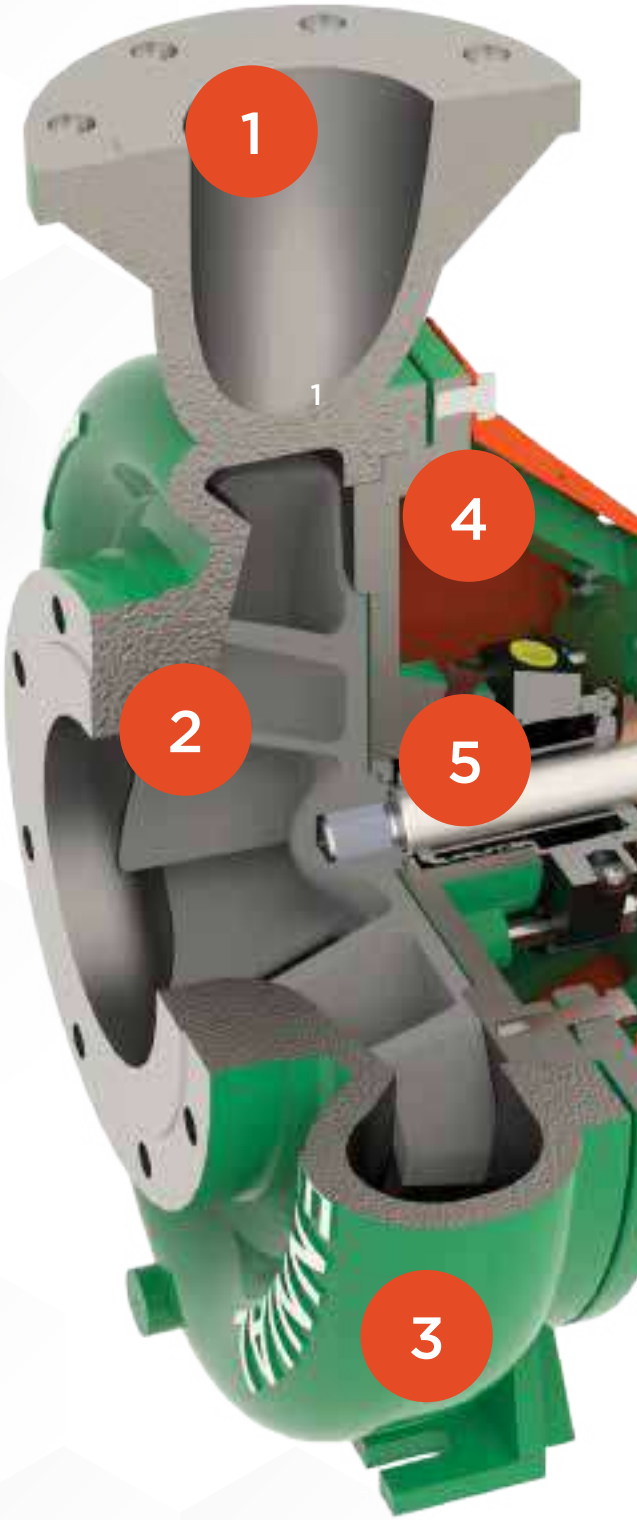
MODEL CA

Technical Handbook
ASME B73.1

CHEMICAL PROCESS PUMP

CENTENNIAL PUMPS

As a subsidiary of A.R. Wilfley and Sons, Inc., Centennial Pumps has combined state of the art software analysis with Wilfley's 100 plus years of pump experience to provide a highly innovative ANSI chemical pump. The model CA provides both optimum hydraulics and high efficiencies (PEI certified). Through use of Wilfley's proprietary WCD4™, Centennial Pumps also provide long lasting durability. Our pumps offer both improved performance and cost benefits compared with other competitive ANSI pump offerings on the market today.

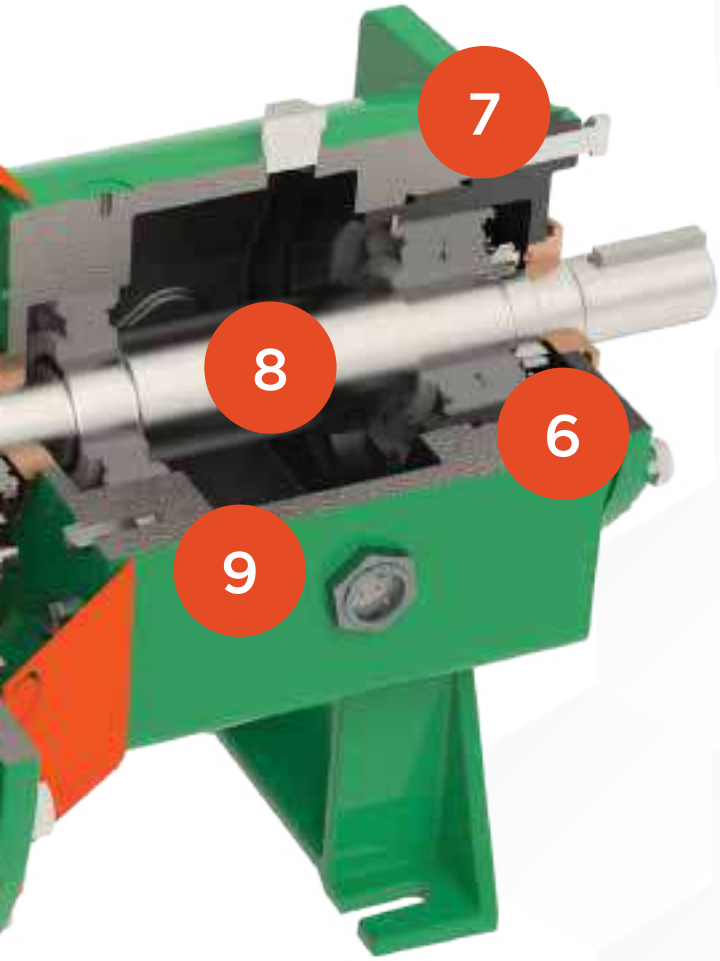


1 **Performance**
Optimized computer generated hydraulics provides Superior Hydraulics for Maximum Flow and Head

2 **Pump Energy Index (PEI)**
Exceeds the U.S. Department of Energy's Conservation Standards for pumps

3 **Material of Construction**
Advanced Metallurgy with Wilfley's WCD4™ Duplex Stainless Steel available for Improved Corrosion and Abrasion Resistance

4 **Specifications**
Meets all ASME B73.1 Technical Specifications
Back pull-out design allows maintenance without disturbing the piping



5 **Sealing**
A variety of rear covers/stuffing box designs are available to meet process requirements

- Mechanical seal
  - Standard Bore - Straight
  - Large Bore - Straight
  - Large Bore - Tapered

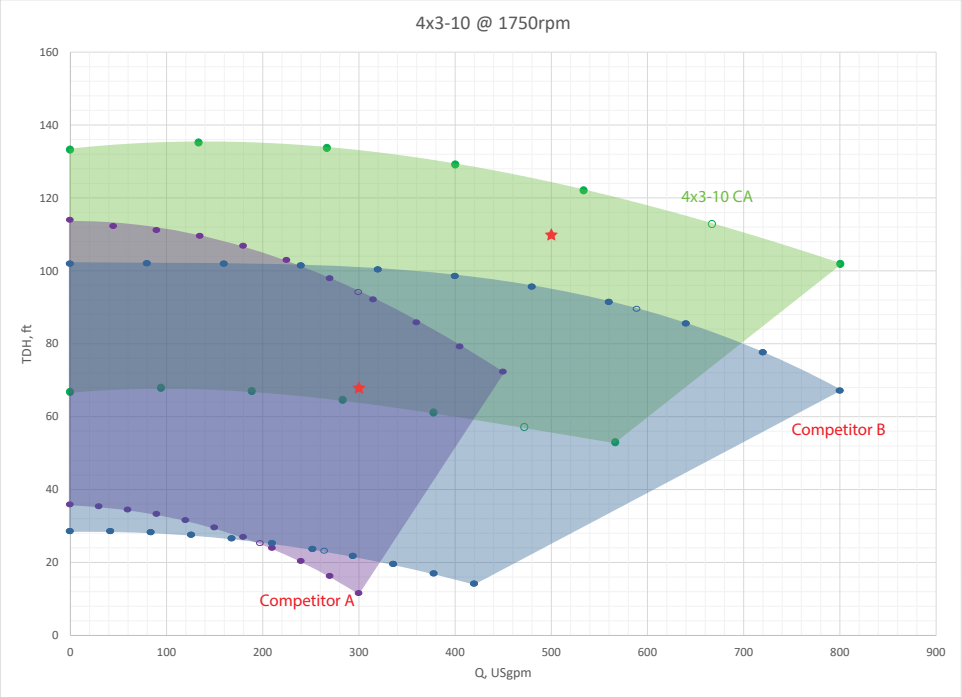
6 **Impeller Clearance Adjustment**
Quick and Accurate Impeller clearance adjustment

7 **Bearing Monitoring**
Taps are standard

8 **Shaft**
Solid 2205 Duplex Stainless Steel Material

9 **Easy Maintenance**
Only 4 wrenches required

DO MORE WITH LESS



Graph above shows a Centennial CA Pump curve vs competitors. The 4x3-10 CA offers a wider range of flow and head than the competitors

★ *BEP per Hydraulic Institute*
○ *BEP Best Efficiency Point*

How can something like a pump contribute to your company's success?

Certainly, you know that reduction in capital is a highly coveted goal to most manufacturers.

However, identifying ways to reduce capital costs can be challenging. By designing a pump with optimized hydraulics, A.R. Wilfley engineers have maximized both the flow and head of our CA pumps.

These optimized hydraulics were achieved through a combination of 102 years of pump design and manufacturing experience, combined with using state-of-the-art software analysis. This effort led to a unique design that allows you to produce more flow and head with a smaller pump.

What does this mean for you?

This means you can buy a smaller pump for a reduced sale price. You have now saved in capital.

Increased flow and head could also potentially allow you to increase your throughput and increase production in certain situations without changing your pump.

Our Centennial pumps' design innovations can save you money!!

METALLURGY

The longer your pump lasts, the stronger your life cycle costs, and ROI become.

The model CA is designed by A.R. Wilfley engineering, with more than 100 years of pump experience, to maximize your pump life.

The model CA offers both cast steel and our patented WCD4™ metallurgy. WCD4™, is Wilfley's specially processed duplex stainless steel with significantly improved abrasion and corrosion resistance properties, providing increased service life in abrasive and chemically aggressive applications.

Wilfley's proprietary WCD4™ material is 60% harder versus 316SS, and you can realize a 60% longer wear life or even more.

Material	Specification	Average Hardness	Minimum Tensile Strength	Minimum Yield Strength	Minimum Elongation
WCD4™	ASTM A890 Grade 1B	345 WBN	164,000 psi (1.131 MPa)	113,000 psi (779 MPa)	16%
316L	ASTM A743 Grade CF-3M	180 WBN	70,000 psi (483 MPa)	20.000 psi (138 MPa)	30%
	Improvement	**91%**	**134%**	**465%**	

What else would you and your company like to see?

How about increased corrosion resistance?

WCD4™ is a superior super-duplex stainless steel that could offer better corrosion resistance than 316SS. As an example, in 65% boiling nitric acid, WCD4™ offers 5x improved corrosion resistance versus 316SS.

Centennial Pumps' superior materials provide longer lasting and more durable pumps for consistent and reliable operation, and longer lasting pumps also directly contribute to reduced cost of ownership for your pumps.

EFFICIENCY

Over the life cycle of a pumping system, energy can account for as much as 75% of the operating costs.

It stands to reason that the easiest and most effective way to reduce operational costs would be to reduce the amount of energy used by the pumps.

By designing a pump using our 102 years of experience, A.R. Wilfley engineers developed our line of Centennial pumps to achieve some of the highest levels of efficiency in the market today, as compared with other ANSI pump offerings.

In addition, our Centennial pumps meet the Department of Energy's PEI rating.

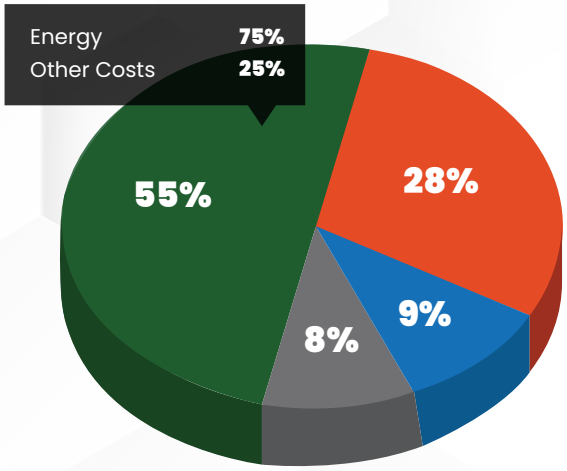
How does improved efficiency help you?

It means your Centennial pump requires less energy to operate versus a less efficient pump. This allows for real bottom-line savings!!

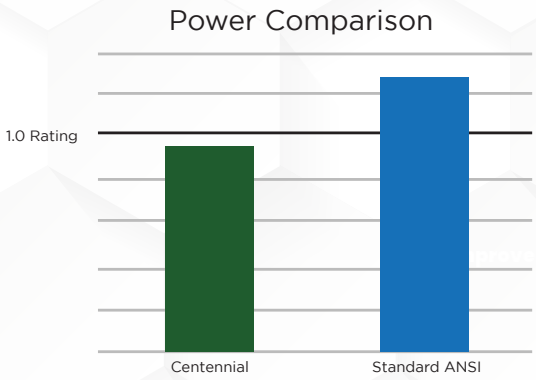
Finally, using reduced amounts of electricity also means a reduction in environmental emissions such as CO2, methane, sulfur dioxide, and nitrogen oxide.

Centennial helps you save energy and money and helps the environment!!

PUMP LIFE CYCLE COST –75HP



- Operating Cost = 55%
- Initial Cost = 8%
- Installation Cost = 9%
- Maintenance Cost = 28%



U.S. DEPARTMENT OF ENERGY

$$PEI = \frac{PER}{PER_{STD}}$$

PEI = Pump Energy Index

PER = Pump Energy Rating, determined by manufacturer

PER_{STD} = Pump Energy Rating determined by DOE, by pump type

DELIVERY

How do delays in delivery of parts and products affect your bottom line?

At Centennial Pumps, we realize that prompt delivery of pumps and parts is key to your successful operation and is a BIG part to your overall pump satisfaction, not to mention an important contributor to your bottom line!

You can have the “best” pump available on the market today, but if you cannot get it to your plant in a timely fashion, it really does not matter.

So, Centennial Pumps, has not only designed the best ANSI pumps available, but we also stock an entire size offering.

This large stock allows Centennial Pumps to partner with you in order to achieve consistent and uninterrupted operation of your facilities. And isn't that what you want?

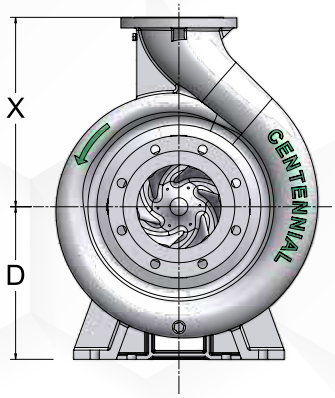
DIMENSIONS

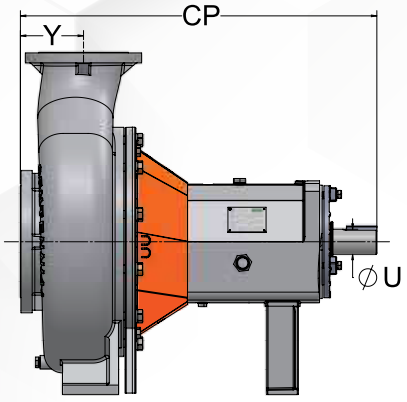
PUMP DIMENSIONS

Dimensions in inches (millimeters)

Group Size	Dimension Designation	Pump Size	CP	D	X	Y	U
1	AA	1.5X1-6	17.5 (445)	5.25 (133)	6.5 (165)	4 (102)	0.875 (22)
	AB	3X1.5-6X	17.5 (445)	5.25 (133)	6.5 (165)	4 (102)	0.875 (22)
	AC	3X2-6	17.5 (445)	5.25 (133)	6.5 (165)	4 (102)	0.875 (22)
	AA	1.5X1-8	17.5 (445)	5.25 (133)	6.5 (165)	4 (102)	0.875 (22)
	AB	3X1.5-8	17.5 (445)	5.25 (133)	6.5 (165)	4 (102)	0.875 (22)
2A	A50	3X1.5-8X	23.5 (445)	8.25 (210)	8.5 (216)	4 (102)	1.125 (29)
	A60	3X2-8X	23.5 (445)	8.25 (210)	9.5 (242)	4 (102)	1.125 (29)
	A70	4X3-8X	23.5 (445)	8.25 (210)	11 (280)	4 (102)	1.125 (29)
	A05	2X1-10X	23.5 (445)	8.25 (210)	8.5 (216)	4 (102)	1.125 (29)
	A50	3X1.5-10X	23.5 (445)	8.25 (210)	8.5 (216)	4 (102)	1.125 (29)
	A60	3X2-10X	23.5 (445)	8.25 (210)	9.5 (242)	4 (102)	1.125 (29)
2B	A40	4X3-10X	23.5 (445)	10 (254)	12.5 (318)	4 (102)	1.625 (41)
	A80	6X4-10X	23.5 (445)	10 (254)	13.5 (343)	4 (102)	1.625 (41)
	A20	3X1.5-13	23.5 (445)	10 (254)	10.5 (266)	4 (102)	1.625 (41)
	A30	3X2-13	23.5 (445)	10 (254)	11.5 (292)	4 (102)	1.625 (41)
	A40	4X3-13	23.5 (445)	10 (254)	12.5 (318)	4 (102)	1.625 (41)
	A80	6X4-13	23.5 (445)	10 (254)	13.5 (343)	4 (102)	1.625 (41)
3	A90	8X6-13	33.875 (860)	14.5 (368)	16 (406)	6 (152)	2.375 (60.33)
	A100	10X8-13	33.875 (860)	14.5 (368)	18 (457)	6 (152)	2.375 (60.33)
	A105	6X4-15	33.875 (860)	14.5 (368)	16 (406)	6 (152)	2.375 (60.33)
	A110	8X6-15	33.875 (860)	14.5 (368)	18 (457)	6 (152)	2.375 (60.33)
	A120	10X8-15X	33.875 (860)	14.5 (368)	19 (483)	6 (152)	2.375 (60.33)
	A105	6X4-17	33.875 (860)	14.5 (368)	16 (406)	6 (152)	2.375 (60.33)
	A110	8X6-17	33.875 (860)	14.5 (368)	18 (457)	6 (152)	2.375 (60.33)
	A120	10X8-17	33.875 (860)	14.5 (368)	19 (483)	6 (152)	2.375 (60.33)

These dimensions are not for construction. Certified dimension prints are available for your specific installation. Flanges are drilled to match ASME B 16.5 150lbs.



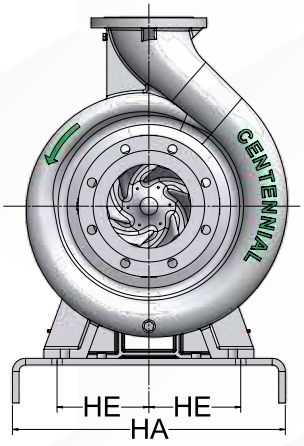


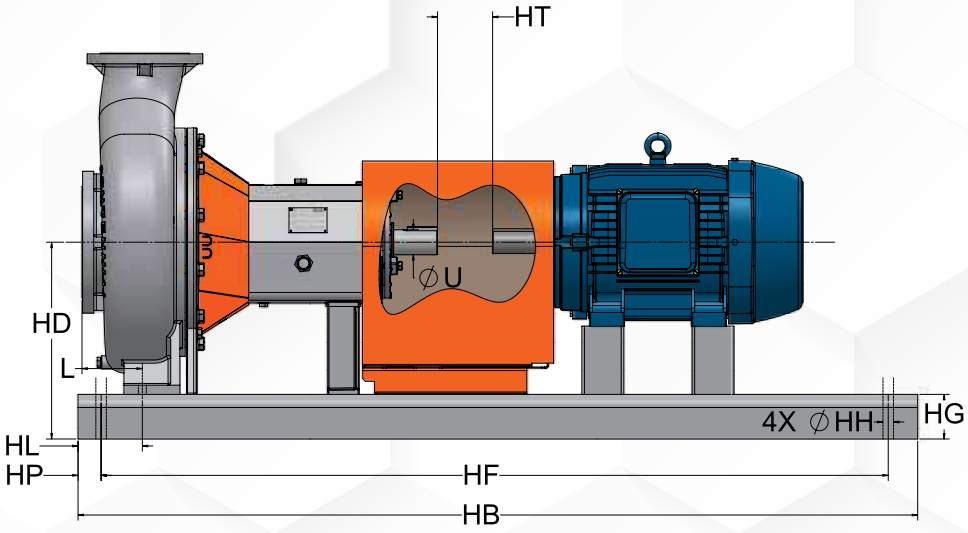
DIMENSIONS

BASE DIMENSIONS

Dimensions in inches (millimeters)

BASE	NEMA MOTOR	IEC MOTOR	HA	HB	HD (MAX)	HE	HG	HG	HH	HL	HP	HT (MIN)
GROUP 1												
139	143T-184T	80M-90L	15 (381)	39 (991)	9 (229)	4.5 (114)	36.5 (927)	3.63 (92)	0.75 (19)	4.5 (114)	1.25 (32)	3.5 (89)
148	213T-256T	132M-160L	18 (457)	48 (1219)	10.5 (267)	6 (152)	45.5 (1156)	4 (102)				
153	284TS-326TS	180M-180L	21 (533)	53 (1346)	12.88 (327)	7.5 (191)	50.5 (1283)	4 (102)				
GROUP 2A /2B												
245	143T-184T	100L-132M	15 (381)	45 (1143)	13.75 (349)	4.5 (114)	42.5 (1080)	3.63 (92)	0.75 (19)	4.5 (114)	1.25 (32)	3.5 (89)
252	213T-215T	160M-180L	18 (457)	52 (1321)	14.13 (359)	6 (152)	49.5 (1257)	4 (102)				
258	254T-286T	200L	21 (533)	58 (1473)	14.75 (375)	7.5 (191)	55.5 (1410)	4 (102)				
264	324TS-365T	225S-225M	21 (533)	64 (1626)	14.75 (375)	7.5 (191)	61.5 (1562)	4 (102)	1 (25)			
268	404T-405TS	250M	26 (660)	68 (1727)	14.88 (378)	9.5 (241)	65.5 (1664)	4.25 (108)				
280	405T-449TS	280S-280M	26 (660)	80 (2032)	15.88 (403)	9.5 (241)	77.5 (1969)	4.25 (108)				
GROUP 3												
368	284T-286T	180L	26 (660)	68 (1727)	19.25 (489)	9.5 (241)	65.5 (1664)	4.25 (108)	1 (25)	6.5 (165)	1.25 (32)	3.5 (89)
380	324T-405T	200L-250M		80 (2032)			77.5 (1969)					
398	444T-449TS	280S-315L		98 (2489)			95.5 (2426)					





CONSTRUCTION DETAILS

		Group 1					Group 2A					
		AA-6 1.5X1-6	AB-6X 3X1.5-6X	AC-6 3X2-6	AA-8 1.5X1-8	AB-8 3X1.5-8	A50-8 3X1.5-8X	A60-8 3X2-8X	A70-8 4X3-8X	A05-10 2X1-10X	A50-10 3X1.5-10X	A60-10 3X2-10X
General												
Pump Weight	lbs	112	120	121	121	132	261	266	278	288	279	289
	kg	51	54	55	55	60	119	121	126	131	126	131
Max. Working Temp.	°F	500	500	500	500	500	500	500	500	500	500	500
	°C	260	260	260	260	260	260	260	260	260	260	260
Max. Working Pressure 150# Flange	psi	290	290	290	290	290	290	290	290	290	290	290
	kPa	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
Max. Working Pressure 300# Flange	psi	450	450	450	450	450	450	450	450	450	450	450
	kPa	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103
Max. Solids Size	in	3/16	1/4	3/16	3/16	1/4	1/4	1/4	1/4	3/16	1/4	1/4
	mm	5	6	5	5	6	6	6	6	5	7	7
Shaft												
Diameter at Impeller	in	0.735	0.735	0.735	0.735	0.735	1.125	1.125	1.125	1.125	1.125	1.125
	mm	18.7	18.7	18.7	18.7	18.7	28.6	28.6	28.6	28.6	28.6	28.6
Diameter at Seal	in	1.375	1.375	1.375	1.375	1.375	1.75	1.75	1.75	1.75	1.75	1.75
	mm	34.9	34.9	34.9	34.9	34.9	44.5	44.5	44.5	44.5	44.5	44.5
Diameter at Coupling	in	0.875	0.875	0.875	0.875	0.875	1.125	1.125	1.125	1.125	1.125	1.125
	mm	22.2	22.2	22.2	22.2	22.2	28.6	28.6	28.6	28.6	28.6	28.6
Diameter between Bearings	in	1.75	1.75	1.75	1.75	1.75	2.125	2.125	2.125	2.125	2.125	2.125
	mm	44.5	44.5	44.5	44.5	44.5	54.0	54.0	54.0	54.0	54.0	54.0
Shaft Overhang	in	6	6	6	6	6	6.725	6.725	6.725	6.725	6.725	6.725
	mm	152.4	152.4	152.4	152.4	152.4	170.8	170.8	170.8	170.8	170.8	170.8
Bearing Span	in	2.583	2.583	2.583	2.583	2.583	5.506	5.506	5.506	5.506	5.506	5.506
	mm	65.6	65.6	65.6	65.6	65.6	139.9	139.9	139.9	139.9	139.9	139.9
Bearings												
Radial Bearing		6207	6207	6207	6207	6207	6309	6309	6309	6309	6309	6309
Thrust Bearing		3207	3207	3207	3207	3207	3309	3309	3309	3309	3309	3309

CONSTRUCTION DETAILS (Continuation)

		Group 2B						Group 3							
		A40-10 4X3-10X	A80-10 6X4-10X	A20-13 3X1.5-13	A30-13 3X2-13	A40-13 4X3-13	A80-13 6X4-13	A90-13 8X6-13	A100-13 10X8-13	A105-15 6X4-15	A110-15 8X6-15	A120-15 10X8-15X	A105-17 6X4-17	A110-17 8X6-17	A120-17 10X8-17
General															
Pump Weight	lbs	326	376	335	335	347	418	765	892	809	857	991	886	943	1073
	kg	148	171	152	152	158	189	347	405	367	389	449	402	428	487
Max. Working Temp.	°F	500	500	500	500	500	500	500	500	500	500	500	500	500	500
	°C	260	260	260	260	260	260	260	260	260	260	260	260	260	260
Max. Working Pressure 150# Flange	psi	290	290	290	290	290	290	290	290	290	290	290	290	290	290
	kPa	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999	1999
Max. Working Pressure 300# Flange	psi	450	450	450	450	450	450	450	450	450	450	450	450	450	450
	kPa	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103	3103
Max. Solids Size	in	1/2	5/16	3/16	1/2	1/2	1/2	3/8	1/4	1/2	1/2	3/8	1/2	1/2	1/2
	mm	13	8	5	13	13	13	10	6	13	13	10	13	14	13
Shaft															
Diameter at Impeller	in	1.125	1.125	1.125	1.125	1.125	1.125	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
	mm	28.6	28.6	28.6	28.6	28.6	28.6	44.5	44.5	44.5	44.5	44.5	44.5	44.5	44.5
Diameter at Seal	in	1.875	1.875	1.875	1.875	1.875	1.875	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	mm	47.6	47.6	47.6	47.6	47.6	47.6	63.5	63.5	63.5	63.5	63.5	63.5	63.5	63.5
Diameter at Coupling	in	1.625	1.625	1.625	1.625	1.625	1.625	2.375	2.375	2.375	2.375	2.375	2.375	2.375	2.375
	mm	41.3	41.3	41.3	41.3	41.3	41.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3	60.3
Diameter between Bearings	in	2.5	2.5	2.5	2.5	2.5	2.5	3.125	3.125	3.125	3.125	3.125	3.125	3.125	3.125
	mm	63.5	63.5	63.5	63.5	63.5	63.5	79.4	79.4	79.4	79.4	79.4	79.4	79.4	79.4
Shaft Overhang	in	6.814	6.814	6.814	6.814	6.814	6.814	8.834	8.834	8.834	8.834	8.834	8.834	8.834	8.834
	mm	173.1	173.1	173.1	173.1	173.1	173.1	224.4	224.4	224.4	224.4	224.4	224.4	224.4	224.4
Bearing Span	in	5.336	5.336	5.336	5.336	5.336	5.336	7.81	7.81	7.81	7.81	7.81	7.81	7.81	7.81
	mm	135.5	135.5	135.5	135.5	135.5	135.5	198.4	198.4	198.4	198.4	198.4	198.4	198.4	198.4
Bearings															
Radial Bearing		6311	6311	6311	6311	6311	6311	NUP313	NUP313	NUP313	NUP313	NUP313	NUP313	NUP313	NUP313
		3311	3311	3311	3311	3311	3311	3313	3313	3313		3313	3313	3313	

HYDRAULIC COVERAGE

Group 1

① 1.5x1-6
② 3x1.5-6X
③ 1.5x1-8
④ 3x2-6
⑤ 3x1.5-8

Group 2A

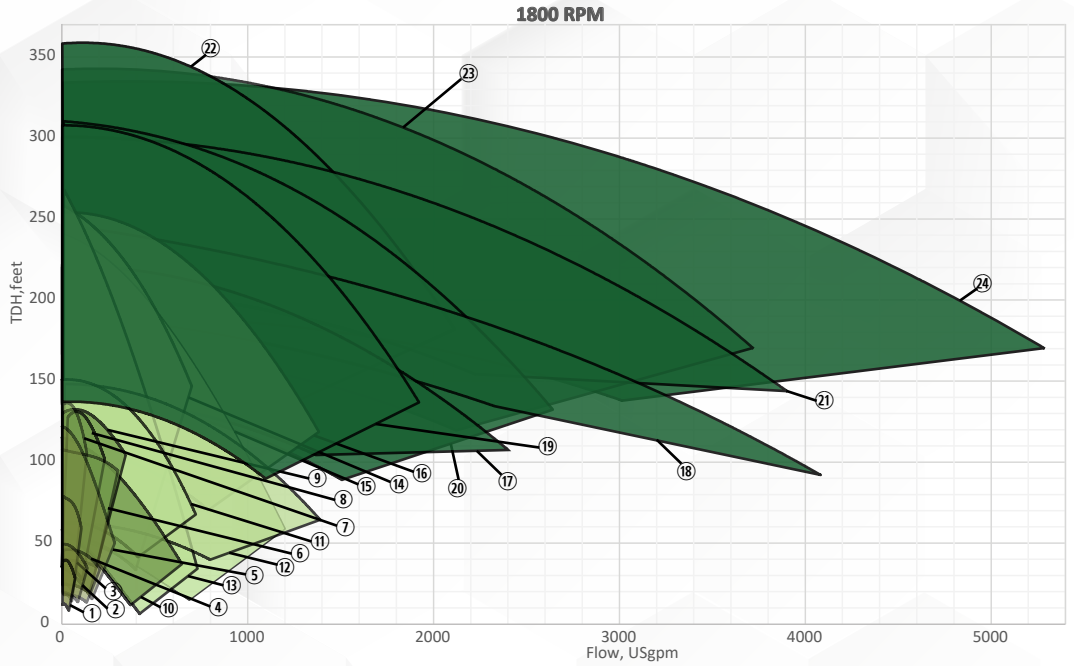
⑤ 3x1.5-8X
⑥ 3x2-8X
⑦ 2x1-10X
⑧ 3x1.5-10X
⑨ 3x2-10X
⑩ 4x3-8X

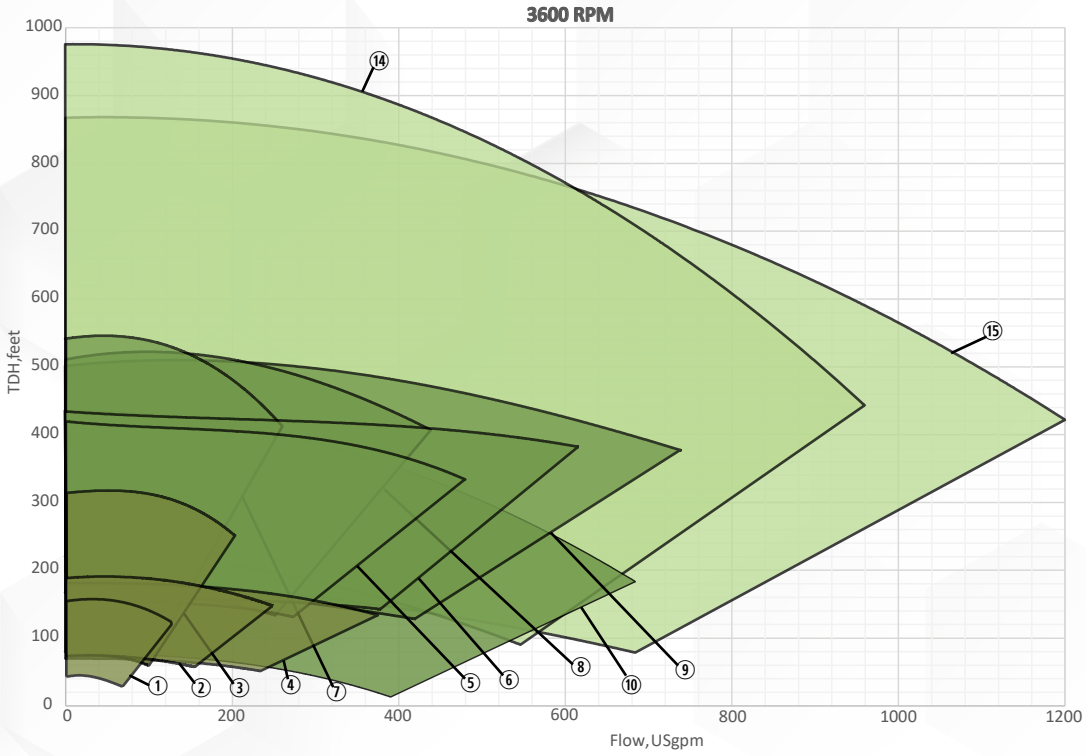
Group 2B

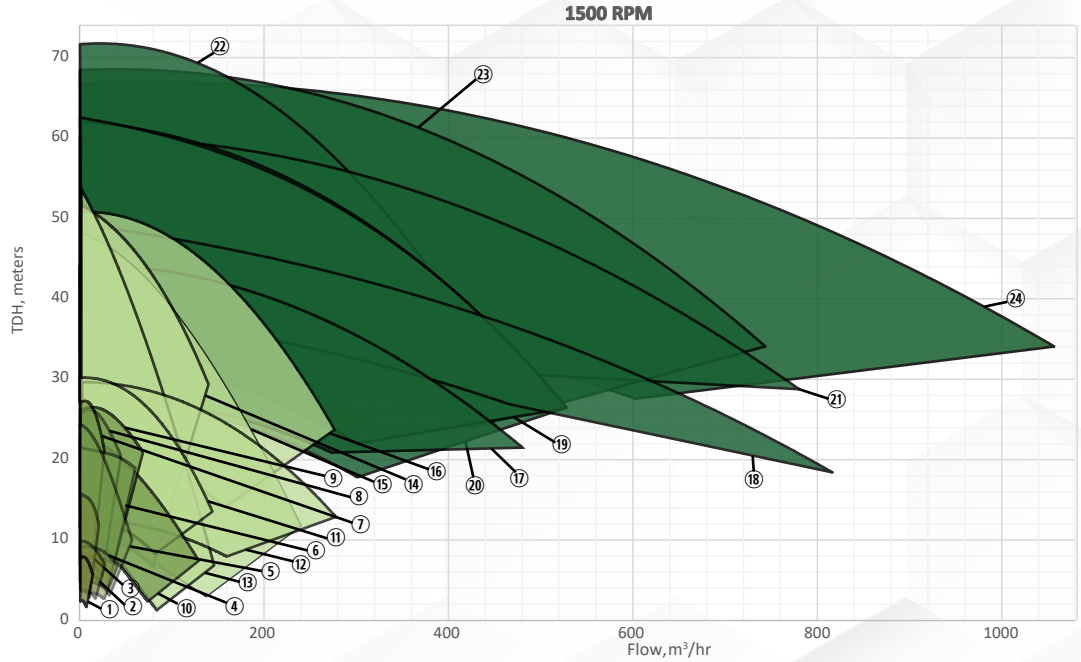
⑪ 4x3-10X
⑫ 6x4-10X
⑬ 3x1.5-13
⑭ 3x2-13
⑮ 4x3-13
⑯ 6x4-13

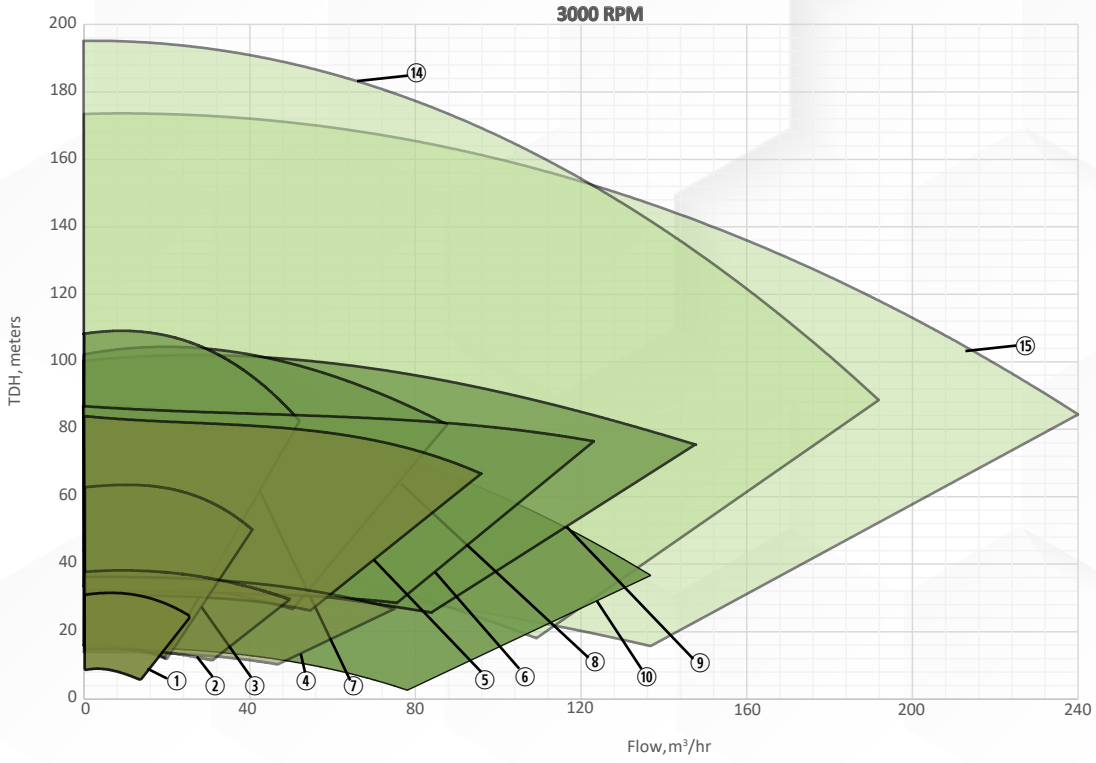
Group 3

⑰ 8x6-13
⑱ 10x8-13
⑲ 6x4-15
⑳ 8x6-15
㉑ 10x8-15X
㉒ 6x4-17
㉓ 8x6-17
㉔ 10x8-17



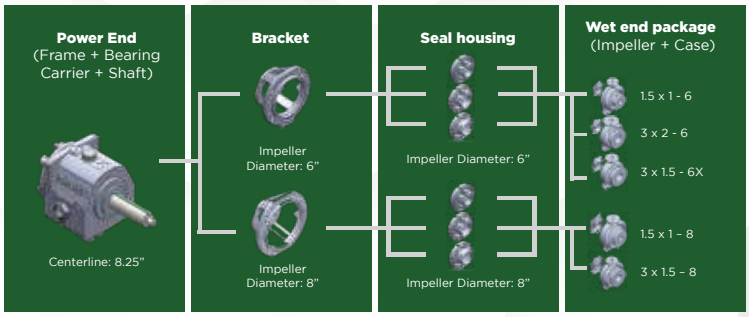



1500 RPM
TDH, meters
Flow, m³/hr
0
10
20
30
40
50
60
70
0
200
400
600
800
1000
22
23
24
21
19
18
20
17
16
15
14
9
8
7
11
6
12
5
13
3
2
1
10
4

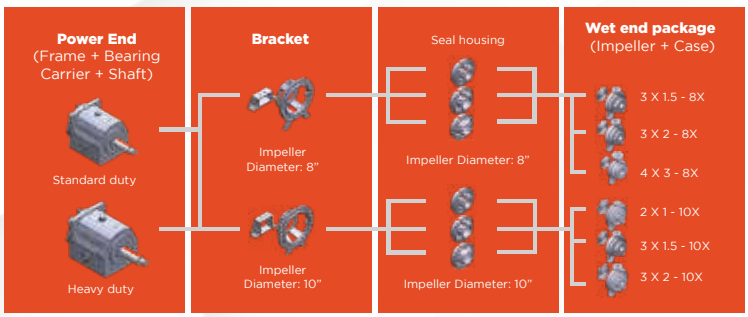

3000 RPM
TDH, meters
Flow, m³/hr
0
20
40
60
80
100
120
140
160
180
200
0
40
80
120
160
200
240
14
15
1
2
3
4
7
5
6
8
10
9

PART INTERCHANGEABILITY

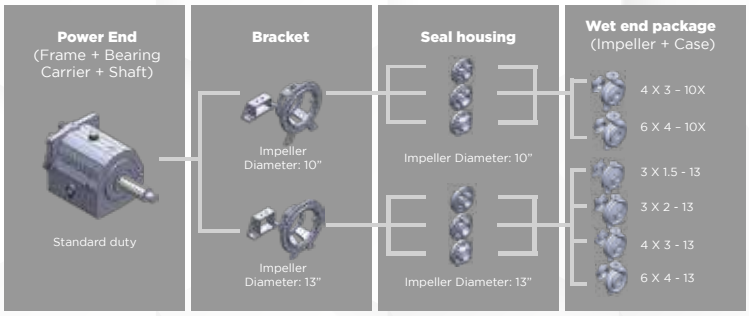
Group 1



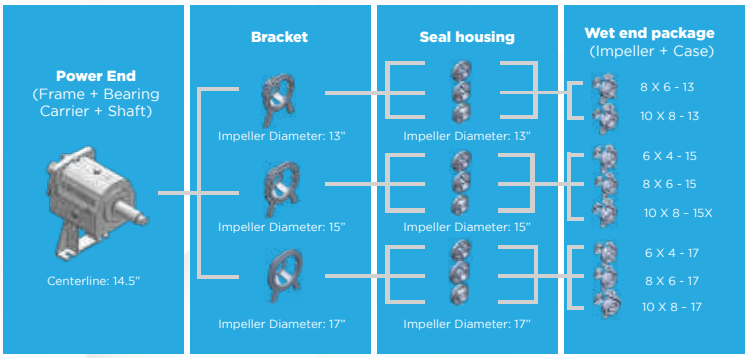
Group 2A – 8.25" Centerline



Group 2B – 10" Centerline



Group 3 – 14.5" Centerline



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